

### **REMARKS**

This communication is a full and timely response to the non-final Office Action dated December 17, 2004 (Paper No./Mail Date 121104). By this communication, the specification, the Title of the Invention, and claim 6 have been amended.

Paragraph [0001] has been amended to indicate the U.S. Patent number of the parent application. No new matter has been added.

The title of the invention has been amended to change "POLISHING METHOD AND POLISHINT APPARATUS" to "POLISHING APPARATUS." No new matter has been added.

Claim 6 has been amended to recite a moving stage on which the work surface is mounted; a processing circuit that generates coordinate values of the work surface by associating work surface measurements with coordinates of the moving stage; an operational control unit that stores the generated coordinate values; a stage control circuit that adjusts the position of the moving stage based on the coordinate values stored in the operational control unit; a laser optical system that scans the work surface by selectively projecting and irradiating laser light onto the work surface; and a polishing tool system that applies pressure to the work surface in an axial direction and provides rotational movement, wherein the stage control circuit adjusts the position of the moving stage as the laser optical system scans laser light onto the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions. Support for the changes to claim 6 can be found variously throughout the specification, for example, at paragraphs [0045], [0048], and [0058] of the specification. No new matter has been added.

Claims 6-8 are pending where claim 6 is independent.

### **Objection to the Specification**

The specification was objected to for failing to indicate the U.S. Patent number for parent application 10/390,769. Applicant has amended paragraph [0001] of the specification to address and remedy this deficiency. Accordingly, Applicant respectfully requests that the objection to the specification be withdrawn.

### **Objection to the Title**

The title of the invention was objected to for allegedly being non-descriptive. Applicant has amended the title to address and remedy this deficiency. In particular, the original title "POLISHING METHOD AND POLISHING APPARATUS" has been changed to

“POLISHING APPARATUS.” Accordingly, Applicant respectfully requests that the objection to the title be withdrawn.

**Rejections Under 35 U.S.C. §112**

Claims 6-8 were rejected under 35 U.S.C. §112, second paragraph as indefinite. Applicant respectfully traverses this rejection. However, in an effort to expedite prosecution, claim 6 has been amended to recite the stage control circuit adjusts the position of the moving stage at a same time the laser optical system selectively irradiates laser light onto the depressions of the work surface, so that the polishing particles of the slurry located in the depressions are aggregated. Accordingly, Applicant respectfully requests that the rejection to claims 6-8 under 35 U.S.C. §112, second paragraph be withdrawn.

**Rejections Under 35 U.S.C. §102**

Claims 6-8 were rejected under 35 U.S.C. §102(e) as anticipated by either *Ushio et al.*, U.S. Patent No. 6,489,624 and/or *Takeishi et al.*, U.S. Patent No. 6,425,801. Applicant respectfully traverses this rejection.

Claim 6 recites a polishing apparatus for polishing a work surface having protrusions and depressions thereon with slurry containing particles, comprising a moving stage on which the work surface is mounted; a processing circuit that generates coordinate values of the work surface by associating work surface measurements with coordinates of the moving stage; an operational control unit that stores the generated coordinate values; a stage control circuit that adjusts the position of the moving stage based on the coordinate values stored in the operational control unit; a laser optical system that scans the work surface by selectively projecting and irradiating laser light onto the work surface; and a polishing tool system that applies pressure to the work surface in an axial direction and provides rotational movement, wherein the stage control circuit adjusts the position of the moving stage as the laser optical system scans laser light onto the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions.

*Ushio* discloses an apparatus that measures the thickness of a layer on a workpiece as the layer is undergoing a polishing process to achieve planarization of the layer. A wafer is held by a wafer carrier 2. A light flux produced by a light source 6 propagates through the window 5 and impinges upon the surface of the wafer 1. The light flux is reflected from the surface of the

wafer 1 and processed by a computer 7 to determine the extent of polishing or a polishing endpoint. However, *Ushio* fails to disclose, teach, or suggest at least that the stage control circuit adjusts the position of the moving stage as the laser optical system scans the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions. At best, *Ushio* discloses that the light impinges the surface of the wafer to determine the extent of polishing or a polishing end point. Accordingly, *Ushio* fails to anticipate claim 6.

*Takeishi* discloses a polishing process monitoring method and apparatus that monitors various parameters and factors associated with the polishing process of a semiconductor wafer 1. The polishing apparatus includes a polishing machine 50 having a polishing table 2, a polisher 4, and a monitoring apparatus 51. A laser 6 irradiates light onto the polishing surface of the wafer 1. The light reflected from the polishing surface of the wafer is detected and processed by a measuring means to determine an optimum endpoint of the polishing process. However, *Takeishi* fails to disclose, teach, or suggest at least that the stage control circuit adjusts the position of the moving stage as the laser optical system scans the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions. At best, *Takeishi* discloses detected and processing light reflected from the work surface to determine an optimum endpoint of the polishing process.

To properly anticipate a claim, the document must disclose, explicitly or implicitly, each and every feature recited in the claim. See *Verdegall Bros. v. Union Oil Co. of Calif.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *Ushio* and *Takeishi* both fail to disclose, teach, or suggest every element recited in independent claim 6, therefore this claim is not anticipated by either reference. Accordingly, Applicant respectfully requests that the rejection of claim 6 under 35 U.S.C. §102 be withdrawn, and this claim be allowed.

#### **Rejection Under 35 U.S.C. §103**

Claims 6-8 were rejected under 35 U.S.C. §103(a) as unpatentable over *Lebel et al.*, U.S. Patent No. 6,319,093 in view of *Komukai et al.*, U.S. Patent Application Publication No. 2003-0171081. Applicant respectfully traverses this rejection.

Claim 6 recites a polishing apparatus for polishing a work surface having protrusions and depressions thereon with slurry containing particles, comprising a moving stage on which the work surface is mounted; a processing circuit that generates coordinate values of the work surface by associating work surface measurements with coordinates of the moving stage; an

operational control unit that stores the generated coordinate values; a stage control circuit that adjusts the position of the moving stage based on the coordinate values stored in the operational control unit; a laser optical system that scans the work surface by selectively projecting and irradiating laser light onto the work surface; and a polishing tool system that applies pressure to the work surface in an axial direction and provides rotational movement, wherein the stage control circuit adjusts the position of the moving stage as the laser optical system scans laser light onto the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions.

*Lebel* discloses a system that integrates film thickness measurements with a chemical-mechanical polishing spin-dry tool. In this system, light is impinged onto a wafer surface 103. The reflected light is captured by a fiber bundle 102 and measured by a detector 106. The detector processes the light to determine the distribution of thickness on the wafer, and determinations of polishing CMP tool operational tolerances can be performed during spin-dry cleaning of the wafer. The Office Action acknowledges that *Lebel* fails to disclose a laser optical system. Applicant adds, however, that *Lebel* also fails to disclose, teach, or suggest at least the stage control circuit adjusts the position of the moving stage as the laser optical system scans the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions.

*Komukai* discloses a polishing pad that includes a pad body 10 and window 2 formed within the pad body 10. *Komukai* further discloses the structure and composition of the polishing pad but fails to disclose, teach, or suggest at least the stage control circuit adjusts the position of the moving stage as the laser optical system scans the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions. As a result, *Komukai* fails to remedy the deficiencies of *Lebel*.

In summary, neither *Lebel* nor *Komukai* either singly or combined disclose, teach, or suggest at least the stage control circuit adjusts the position of the moving stage as the laser optical system scans the depressions of the work surface, so that the polishing particles of the slurry are aggregated in the depressions. At best, the combined references disclose a system that irradiates light onto a wafer surface to determine the distribution of thickness on the wafer, and determinations of polishing CMP tool operational tolerances can be performed during spin-dry cleaning of the wafer. Thus, a *prima facie* case for obviousness has not been established.

To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Moreover, obviousness "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." ACS Hosp. Sys. V. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). For at least the above reasons, Applicant respectfully requests that the rejection of claim 6 be withdrawn, and claim 6 be allowed.

Claims 7 and 8 depend from claim 6. By virtue of this dependency, Applicant submits that claims 7 and 8 are allowable for at least the same reasons given above with respect to claim 6. In addition, Applicant submits that claims 7 and 8 are further distinguished over *Lebel* and *Komukai* by the additional elements recited therein, and particularly with respect to each claimed combination. Applicant respectfully requests, therefore, that the rejection of claims 7 and 8 under 35 U.S.C. §103 be withdrawn, and these claims be allowed.

#### **Double Patenting Rejection**

Claims 6-8 were rejected under the judicially created doctrine of double patenting over claims 6 and 7 of U.S. Patent No. 6,683,140. Applicant respectfully traverses this rejection.

To overcome the double-patenting rejection Applicant has enclosed herewith a Terminal Disclaimer to disclaim or dedicate to the public any terminal part of the patent that issues from this application. Accordingly, Applicant respectfully requests that the double patenting rejection be withdrawn.

**Conclusion**

Based on at least the foregoing amendments and remarks, Applicants submit that claims 6-8 are allowable, and this application is in condition for allowance. Accordingly, Applicants request favorable reexamination and reconsideration of the application. In the event the Examiner has any comments or suggestions for placing the application in even better form, Applicants request that the Examiner contact the undersigned attorney at the number listed below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. SON-2611/DIV from which the undersigned is authorized to draw.

Dated: February 1, 2005

Respectfully submitted,

By 

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Attachments:            Terminal Disclaimer

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